MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

TDB1131 – DATABASE SYSTEMS

(All sections / Groups)

22 OCTOBER 2019
2.30 p.m. – 4.30 p.m.
(2 hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **5 QUESTIONS**.

2. Attempt all questions in this question paper. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please print all your answers in the Answer Booklet provided.

QUESTION 1

You are helping a homestay rental company to develop a new database. Below is the collected information about the company:

- They are the middleman between owners and customers.
- Each owner may have many houses to rent. However, each house can only be owned by one owner.
- The customer can book the house many times at different time frames.
- Payment is charged on daily basis according to specific date.

(a) Drafts TWO sets of business rules based on the information given.

[2 marks]

(b) Design the entity relationship diagram (ERD) by using the Crow's Foot Model. [Hints: must include primary key (PK), foreign key (FK), AT LEAST 2 attributes (not including PK and FK) for each entity, and associate entity if any] [8 marks]

Continued.....

QUESTION 2

FatherName	MotherName	HomeAddress	Region	RegisDate	Contact	ChildID	ChildName	Class	Teacher	Age	FeesAmt	Fees		
												Jan	Feb	...Dec
Wong Hock Kin	Chia Yun Yin	20, Tmn. Dahlia	Bkt. Baru	01/12/2018	012-7765655	2018_00023	Wong Siu Min	N1	Marry	3	380	Paid	Paid	
						2018_00024	Wong Siu Moon	N1	Marry	3	380	Paid	Paid	
Siva A/L Vishnu	Wani A/P Subarmanium	2, Tmn. Manga	Bkt. Piatu	25/12/2017	06-2315433	2017_00032	Ravi A/L Siva	K1	Usha	5	350	Paid	Paid	
				23/12/2018		2015_00033	Letchumi A/L Siva	N2	Christine	4	350	Paid	Paid	

Figure 1. Day Care (Complete)

FatherName	MotherName	HomeAddress	Region	RegisDate	Contact	ChildID	ChildName
Wong Hock Kin	Chia Yun Yin	20, Tmn. Dahlia	Bkt. Baru	01/12/2018	012-7765655	2018_00023	Wong Siu Min
						2018_00024	Wong Siu Moon
Siva A/L Vishnu	Wani A/P Subarmanium	2, Tmn. Manga	Bkt. Piatu	25/12/2017	06-2315433	2017_00032	Ravi A/L Siva
				23/12/2018		2018_00033	Letchumi A/L Siva

Figure 2. Day Care Part 1

Class	Teacher	Age	FeesAmt	Fees		
				Jan	Feb	...Dec
N1	Marry	3	380	Paid	Paid	
N1	Marry	3	380	Paid	Paid	
K1	Usha	5	350	Paid	Paid	
N2	Christine	4	350	Paid	Paid	

Figure 3. Day Care Part 2

Figure 1 shows the nursery information of a kindergarten. Figures 2 and 3 further show the information in details by breaking the table in Figure 1 into sub tables. The shown attributes are *FatherName, MotherName, HomeAddress, Region, RegisDate, Contact, ChildID, ChildName, Class, Teacher, Age, FeesAmt*, and *payment status* for each month (from January to December).

Each month, an invoice is provided by using the children name after their parents have made the payment. Recently, the kindergarten wants to have a database system to keep the records. Suppose you have been hired to implement the system and decided to start from normalisation.

(a) Identify the attributes that is suitable to use as composite key in first normal form and justify your result. [1 mark]

(b) Please identify the composite keys and attributes for the first normal form. [3 marks]

(c) Complete the normalisation process by performing second and third normalisation. [6 marks]

Continued.....

QUESTION 3

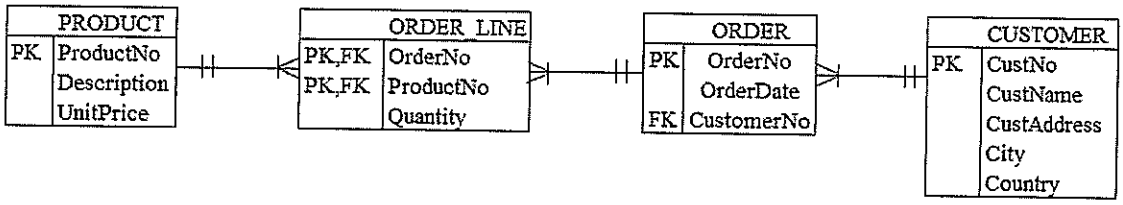

Figure 4. ERD

Naim is writing Structured Query Language (SQL) to implement the entity relationship diagram (ERD) shown in Figure 4. Suppose you are Naim. Solve the following questions with appropriate SQL. The date format of the Database Management System (DBMS) is YYYY-MM-DD.

(a) Create a table Product with appropriate data types. **NO** null value is allowed for all attributes. [3 marks]

Table 1: Product

ProductNo	Description	Quantity	UnitPrice
D333	White Board	10	100
A235	Pencil case	100	3.5
A123	Pencil	100	3

(b) List each order number with date, customer name and customer number. Sort the record by date. [2.5 marks]

(c) Naim has designed the following SQL to fulfil the request by his client. He needs to list the total price of each client by order number. Below is the sample output:

Table 2: Sample output

OrderNo	Date	CustomerNo	CustomerName	TotalPrice
1232	11/04/2018	8788	Billy	20

Here is the SQL written by Naim:

```
SELECT OrderNo, Date, CustomerNo, CustomerName, SUM(UnitPrice *
Quantity) AS 'TotalPrice' FROM PRODUCT AS p, ORDER_LINE AS ordl,
ORDER AS ord,
WHERE p.ProductNo = ordl.ProductNo AND
ordl.OrderNo = ord.OrderNo AND
CustomerNo = CustNo;
```

Check the correctness of the query and justify your answer. [1.5 marks]

(d) Assume table OrderLine has created. Change ProductNo to foreign key. This foreign key will restrict the delete option and enforce the update. [3 marks]

Continued.....

QUESTION 4

(a) Questions below are related to database development life cycle.

(i) During database initial study, what questions would you ask in order to define the initial objectives of a company? List TWO questions. [2 marks]

(ii) Suppose you are the designer. Your view and manager's view about the data are different. Please provide two examples view of each party. [3 marks]

(b) Describe the database recovery process through the use of deferred-write and write-through techniques. [5 marks]

Continued.....

QUESTION 5

(a) A distributed database management system (DDBMS) of a university is shown in Figure 5. These operations include remote request, remote transactions, distributed transactions and distributed requests are needed to execute the following SQL commands. Based on the given SQL command, specify the minimum types of operation the database must support and justify your answer.

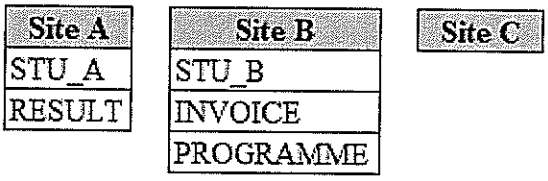

Figure 5. DDBMS

(i) At site C:

```
SELECT * FROM RESULT WHERE RES_CGPA > 3.66;
```

[1.5 marks]

(ii) At site A:

```
BEGIN WORK;
UPDATE STU_A
SET STU_CONTACT='011-6112212';
INSERT INTO INVOICE (INV_NO, STU_ID, INV_DATE, INV_TOTAL)
VALUES('IW321112', '1001100991', '2018-09-18', 2500);
COMMIT WORK;
```

[1.5 marks]

(iii) At site C:

```
SELECT * FROM STUDENT
WHERE STU_NAME LIKE 'M%';
```

[1.5 marks]

(iv) At site B:

```
SELECT STU_NAME, INV_TOTAL FROM STUDENT, INVOICE
WHERE INV_TOTAL > 1000 AND STUDENT.STU_ID = INVOICE.STU_ID;
```

[1.5 marks]

(b) The relational database has faced challenges due to the emergence of object-oriented databases and the development of data warehouse. The latest challenge is big data. Answer the following questions about big data.

(i) What is big data? [2 marks]

(ii) Why big data is a challenge to relational database? [2 marks]

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